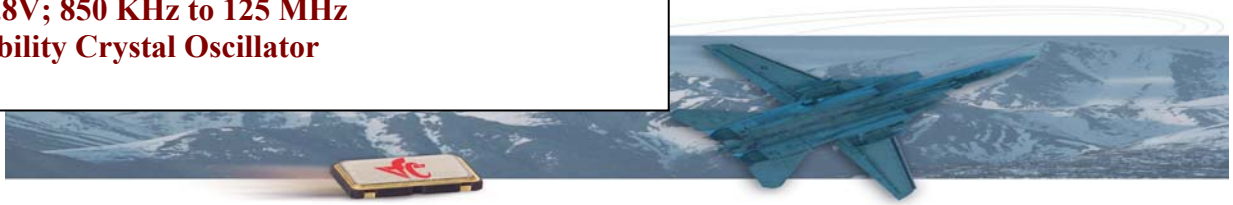


VFH2321, thru VFH2324; VFH2421 thru VFH2424
HCMOS 1.8V; 850 KHz to 125 MHz
High Reliability Crystal Oscillator



High Reliability Product Specification

XO

Features

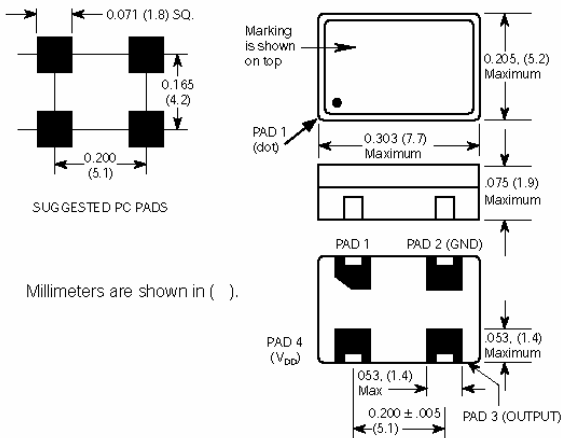
- Leadless chip carrier package is hermetically sealed for superior aging and field performance
- Crystal angle controlled by +/-0.5 minutes for excellent temperature stability
- 168 hour Class B burn-in and extensive environmental testing for best performance in rugged field environments
- Guaranteed start-up with a ramping DC supply
- Start-up time less than 5 ms, typical
- Low jitter of 6ps RMS max ensures stable data transmission
- Tristate option available
- Calculated MTBF is 3.8×10^6 hours at 125°C

Description

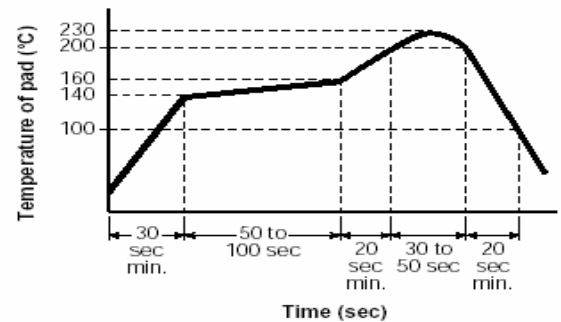
These high reliability oscillators provide HCMOS clock waveforms for applications subjected to the most stringent environmental conditions. They are mechanically robust and weigh less than 0.2 grams. This 5X7mm SMD package has a hermetic seal, thus ensuring the integrity of each oscillator. Each oscillator is burned-in at 125°C for 168 hours, temperature cycled and centrifuged then fully tested in accordance with Table 1. Reliability tests are performed per Table 2. The calculated MTBF is 3.8×10^6 hours at 125°C.

Connections

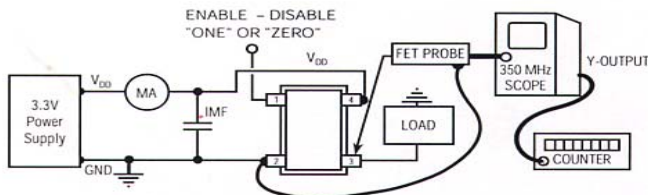
	Non-Tristate Models VFH2321, 2322, 2323, 2324	Tristate Models VFH2421, 2422, 2423, 2424
1.	Not Used	Floating or "1": Oscillator runs Ground or "0": Disable or Tristate
2.	Ground and Case	
3.	Output	
4.	V _{DD}	



Outline Drawing



Recommended Reflow Soldering Profile



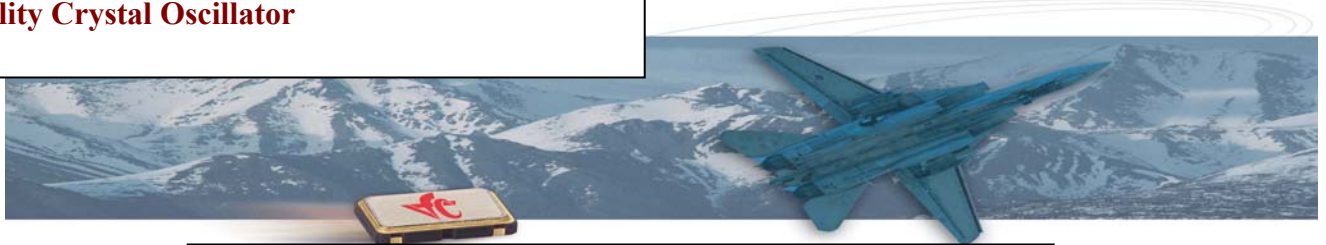
To adapt Fet probe to receptacle use Tektronix Part #103-0164-00

To connect output to scope use Tektronix Part #131-0258-00 (receptacle)

TEST CIRCUIT



VFH2321, thru VFH2324; VFH2421 thru VFH2424
HCMOS 1.8V; 850 KHz to 125 MHz
High Reliability Crystal Oscillator



ELECTRICAL SPECIFICATIONS

Frequency Range	850 KHz to 165 MHz				
Frequency Stability	Includes calibration at 25°C, operating temperature change of input voltage, change of load, shock and vibration				
	MIN	TYP	MAX	UNITS	
Input Voltage	1.7	1.8	1.9	volts	
Load			15	pf	
Input Current	850 KHz to 70 MHz, with 15pf load		7.0	10.0	mA
	70.1 to 165.0 MHz with 15pf load		15.0	18.0	mA
Output Levels					
“0” Level				10% V _{DD} volts	
“1” Level	90% V _{DD}			volts	
Rise and Fall Times					
Jitter				5 ns	
From positive edge to positive edge				10 ps RMS	
Symmetry					
850 KHz to 70MHz, @ 50% V _{DD}	48/52		45/55	percent	
70.1 to 165.0 MHz, @ 50% V _{DD}	45/55		40/60	percent	
Aging					
First year	3			ppm	
After first year	1			ppm/yr	
Input Requirements for Pin 1:					
“1”:	On-Pin 1 may float or 90% V _{DD} min.				
“0”:	Tristate-Pin 1 requires 10% V _{DD}				

ENVIRONMENTAL SPECIFICATIONS

(All Models)

Shock-1000 Gs, 0.35 ms, ½ sine wave, 3 shocks in each plane

Vibration-10-2000 Hz of .06” d.a. or 20Gs, whichever is less

Humidity-Resistant to 85° R.H. at 85°C

Storage Temperature-55° to +150°C

THERMAL CHARACTERISTICS

Thermal Resistance

From Junction to Case, R_{θjc} 16 °C/Watt

SURFACE MOUNT APPLICATION

These packages are designed for reflow soldering in accordance with recommended profiles. For hand-soldering, the temperature of the iron should not exceed 400°C for three seconds



VFH2321, thru VFH2324; VFH2421 thru VFH2424
HCMOS 1.8V; 850 KHz to 125 MHz
High Reliability Crystal Oscillator



Models 1.8V	Frequency Stability	Temperature	Option
VFH2321	+/-25ppm	-55 to + 85°C	Non-Tristate
VFH2322	+/-50ppm	-55 to + 85°C	Non-Tristate
VFH2323	+/-75ppm	-55 to + 125°C	Non-Tristate
VFH2324	+/-50ppm	-55 to + 125°C	Non-Tristate
VFH2421	+/-25ppm	-55 to + 85°C	Tristate
VFH2422	+/-50ppm	-55 to + 85°C	Tristate
VFH2423	+/-75ppm	-55 to + 125°C	Tristate
VFH2424	+/-50ppm	-55 to + 125°C	Tristate

MECHANICAL SPECIFICATIONS

- Leak-** MIL STD 883, Method 1014, condition A1
- Case-** Hermetically sealed ceramic LCC
- Pads-** 15 Microinch of gold over nickel
- Marking-** Epoxy ink or laser engraved
- Resistance to Solvents-** MIL STD 202, Method 215

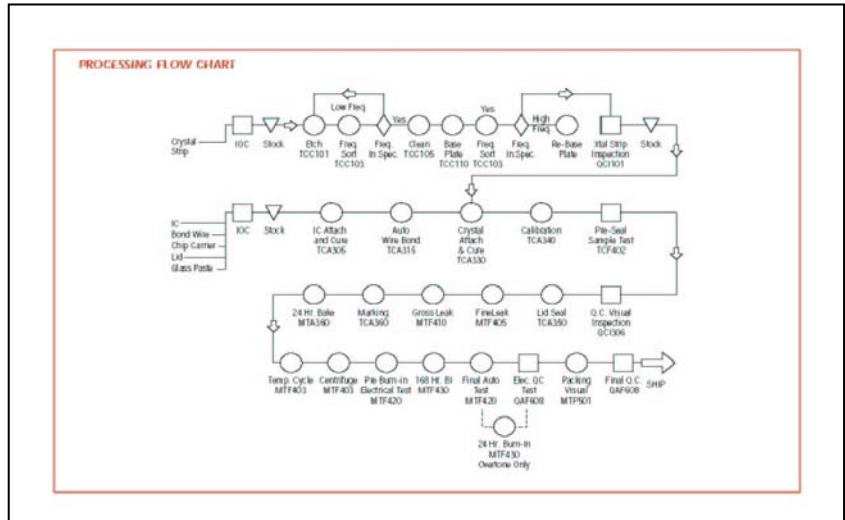
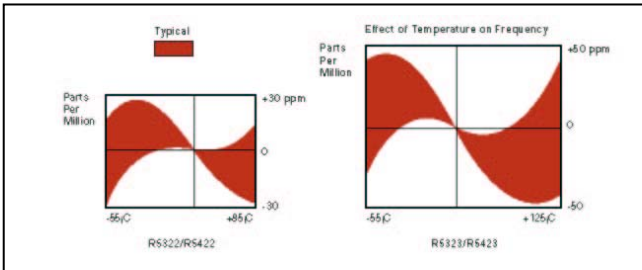


Table 1

Each unit undergoes the following:

1. Stabilization Bake MIL-STD-883 Method 1008, Cond, B
2. Temperature Cycling MIL-STD-883 Method 1010, Cond, B
3. Constant Acceleration MIL-STD-883 Method 2001, Cond, A
4. Burn-in MIL-STD-883 Method 1015, Cond B (125°C for 168 hours with bias)
5. Fine Leak MIL-STD-883 Method 1014, Cond. A1
6. Gross Leak MIL-STD-883 Method 1014, Cond C
7. Electrical Test at 25°C and temperature extremes, as follows:

- | | |
|---------------|-------------------------------------|
| A. Frequency | F. Frequency at max V _{DD} |
| B. Current | G. Frequency at min V _{DD} |
| C. Rise Time | H. "Zero" logic level |
| D. Fall Time | I. "One" logic level |
| E. Duty Cycle | J. Tristate |

Test Data on each unit is available for additional cost

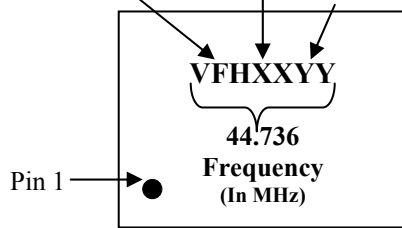
VFH2321, thru VFH2324; VFH2421 thru VFH2424
HCMOS 1.8V; 850 KHZ to 125 MHz
High Reliability Crystal Oscillator



MARKING SPECIFICATION

The format for the marking is:

Valpey-Fisher Model Number (XX)
Hi-Rel Oscillator Date Code (YY)



HOW TO ORDER

For Part Number, put model type before model number, and add frequency in MHz, for example:

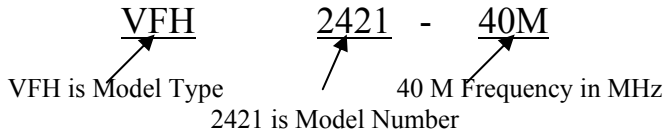


TABLE 2- RELIABILITY TEST PROCEDURE AND CONDITIONS FOR QUARTZ CRYSTAL OSCILLATORS

I. Group A

Electrical Characteristics at -55°, 25° and 125° (85° for VFH2121, VFH2122, VFH2221 and VFH2221)

- Frequency @ 1.7, 1.8 and 1.9 volts (units)
- Symmetry (Duty Cycle)
- Input current
- Zero/One levels
- Rise/Fall times
- Physical Dimensions
 - Length/width
 - Height
 - Seal (Visual)
 - Package finish (Corrosion, discoloration, etc.)
 - Marking placement/legibility

II. Group B- Life Test

1000 hrs aging at or above 125°C. 1.8V VDC, with proper load

III. Group C- All units have passed Group A testing

A. Subgroup 1-8 pcs.

Standard	Condition	Description	End point measurement
MIL-STD-883	Method 2002 COND.B	Mechanical Shock 1500 g's, 5ms 5 drops, 6 axis	Frequency Output Waveform
MIL-STD-883	Method 2007 COND. A.	Vibration, var. freq. 20 g's, .06" disp., 20- 20, 000-20 Hz	Frequency Output waveform
MIL-STD-883	Method 2003	Solderability	Visual 95% coverage

B. Subgroup 2-4 pcs (One-half of Subgroup 1)

MIL-STD-883	Method 1011 COND. B	Thermal Shock Liq. To liq. 15 cycles	Frequency Output waveform
MIL-STD-202	Method 105 COND. B	Altitude, 3.44 inch Hg. 12 hrs	Frequency Output waveform
MIL-STD-883	Method 1004	Moisture resist. With 5 OR 3.3V applied 25-65°C, 90 to 100% RH, 10 cycles	Frequency Output waveform
MIL-STD-202	Method 210 COND.A	Resistance to Solder Heat Immersion @350°C 3.5 sec	Frequency Output waveform

C.Subgroups 3-4 pcs. (One half of Subgroup 1)

Standard	Condition	Description	End point measurement
	Storage Temp. No. Oper	24 hrs. @ -55°C 24 hrs. @ 125°C	Frequency Output waveform
MIL-STD-883	Method 1009 COND. A	Salt Atmosphere 24 hrs. @ 35°C	Frequency Output waveform
MIL-STD-883	Method 1014 COND. B	.5-3.0% Solution Fine Leak	Visual Qs <5 X10 ⁻⁸
MIL-STD-883	Method 1014 COND. C	Gross Leak	Visual in 125°C Detector fluid

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